



**ADMINISTRATIVE REPORT**

Report Date: 2009-04-24  
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Meeting Date: May 7, 2009

TO: Standing Committee on City Services and Budgets  
FROM: The Director of Planning and the Manager of the Sustainability Group  
SUBJECT: Passive Design Tool Kit

**RECOMMENDATION**

- A. THAT Council endorse the "Passive Design Tool Kit" and the "Passive Design Tool Kit for Homes" as official City of Vancouver publications.
- B. THAT Council direct staff to develop and deliver a passive design engagement program to build capacity and awareness for both City staff and the development industry on the benefits of passive design.
- C. THAT Council direct staff to bring forward new or amended land use policy on an ongoing basis with the goal of promoting and implementing passive design strategies and approaches in the City of Vancouver.

**CITY MANAGER'S COMMENTS**

The City Manager recommends approval of the recommendations in this report.

### **COUNCIL POLICY**

In March 2005, Council approved the Community Climate Change Action Plan to reduce greenhouse gas (GHG) emissions in the community to 6% below 1990 levels by 2012.

In March 2007, Council passed a motion directing staff to begin planning for significant, long range GHG reductions with the eventual goal of becoming a carbon-neutral city.

In May 2007, Council adopted the Building By-law (VBBL) which included environmental protection objectives. Although no new "green building" requirements were added to the by-law at that time, the environmental protection objectives were put into place to facilitate the future development of the City's Green Building Strategy.

In July 2007, Council adopted targets to reduce community GHG emissions to 33% below current levels by 2020 and 80% below current levels by 2050. In addition, Council adopted the target of having all new construction in Vancouver be GHG neutral by 2030.

In November 2008, Council passed a motion to remove 5 barriers to green building approaches and directed staff to report back when other barriers were identified and removed.

### **PURPOSE**

The purpose of this report is to promote the adoption of passive design strategies in building design and construction in Vancouver with the goal of improving energy efficiency, and occupant comfort in order to reduce GHG emissions in Vancouver.

### **SUMMARY**

Passive Design is a proven concept for improving energy efficiency that, to date, has not been widely employed by municipalities to reduce GHGs. Should Council accept the recommendations in this report it would be the first jurisdiction in North America to actively pursue a program that addresses the architecture of buildings to reduce GHGs beyond the application of green building codes. The staff recommendation accomplishes this in two ways: (1) through outreach and capacity building; and (2) through ongoing policy development and amendment. The Passive Design Tool Kits form the core content of the strategy and are appended to this report. (Appendix A & B are limited distribution and linked from the May 7, 2009 CS&B agenda at [http://vancouver.ca/ctyclerk/councilmeetings/meeting\\_schedule.cfm](http://vancouver.ca/ctyclerk/councilmeetings/meeting_schedule.cfm).)

### **BACKGROUND**

In 2007 Council approved a work plan for staff to begin policy research and recommend by-law amendments to achieve "greener" buildings. The promotion of passive design through building policy was specifically identified in this report as a strategy for further exploration. Council has also adopted a series of ambitious targets for greenhouse gas (GHG) reductions including targets to reduce community GHG emissions by 33% below current levels by 2020 and 80% below current levels by 2050 to reflect and support adopted provincial targets. With regard to buildings in Vancouver, Council adopted the target of having all new construction in Vancouver GHG neutral by 2030.

## DISCUSSION

The two Passive Design Tool Kits detail a number of strategies for achieving energy efficiency and improved thermal comfort through building design. The guides detail the strategies and evaluate each design element in terms of its relative cost and effectiveness. The two Tool Kits are:

- 1) The 'Vancouver Passive Design Tool Kit' focuses primarily on what the VBBL classifies as Part 3 buildings, encompassing a wide range of project types from high rise residential, to commercial and mixed-use buildings. This guide is based on computer generated building energy models calibrated to Vancouver building typologies and local climate to support claims about the benefits of each design strategy.
- 2) The 'Vancouver Passive Design Tool Kit for Homes' is directed at wholly residential Part 9 wood frame buildings as defined by the VBBL, the majority of which are one- and two-family dwellings. This document is more prescriptive than the Part 3 guide, reflecting the prescriptive nature of Part 9 of the VBBL. This Tool Kit is based on the extensive research of the Passiv Haus Institute and adapted to the Vancouver local climate and building market.

Both Tool Kits were written with the following goals:

- To raise the collective level of knowledge of staff and the Development and Design community regarding the energy efficiency and thermal comfort benefits of passive design.
- To Outline best practices and define how passive design can be applied in Vancouver's climate to maximize energy savings and occupant comfort.
- To establish a commonly understood definition of passive design across the industry in Vancouver.

Passive design is the most effective tool for achieving energy efficiency and optimizing thermal comfort in buildings. The Passive Design Tool Kits define passive design as, "an approach to design that discourages reliance on mechanical systems for heating, cooling and lighting by harnessing naturally occurring phenomena such as the power of the sun and wind patterns to maintain consistent indoor temperatures, comfortable thermal environments, and interior illumination". (Appendix A&B) Passive design in the Vancouver context works on the premise that, if applied successfully, the need for mechanical intervention for thermal comfort reasons can be eliminated entirely in some applications.

Passive design strategies covered in the Tool Kits include passive heating using the sun's energy, solar rejection to prevent excessive heat gain, using the sun to day-light interior spaces, and developing natural ventilation systems through building form. Elements of these strategies include modifications to the building envelope, the placement and quality of glazing, the form and shape of the building and interior spaces, and as the choice of building materials.

The strategies detailed in the Tool Kits engage designers and regulators to consider energy reduction and human thermal comfort as primary goals at the outset of the design of any building. The incorporation of passive design strategies into new building projects in Vancouver will help projects to meet and surpass the required energy utilization standards in the VBBL. Reducing energy loads through architectural design will also allow buildings in

Vancouver to move toward the goal of achieving carbon neutrality in all new development by 2030 and will be supportive of helping to make Vancouver the greenest city in the world.

The first recommendation of this report is for Council to endorse the Passive Design Tool Kits as a means of reducing GHGs in the City of Vancouver. This recommendation is critical to capacity building and future policy development and implementation; by establishing an agreed-upon official definition and principles of passive design for Vancouver, the Tool Kits will serve as a basis for constructive policy discussion and can be used as a tool to reorient building design toward a new baseline of energy efficiency and thermal comfort.

The second recommendation of this report directs staff to engage with the development and design communities to disseminate the content of the Tool Kits. Staff propose two strategies to accomplish this, the first is to develop a strategy to engage with stakeholders directly through a targeted outreach program focussed on designers and developers. This will be supported by conventional communication tools such as staff presentations, the City website and printed media. The second strategy will be to engage stakeholders directly through points of contact where City staff are engaged by the development community via the pre-application and development permit process.

The third recommendation in this report directs staff to examine current policy, and to bring forward recommendations, where appropriate, to integrate passive design as defined by the Toolkits. This will be done by bringing forward new policy, or amending existing guidelines. Within this policy review, staff will make recommendations, where appropriate, that remove policy barriers to the inclusion of passive design elements. An economical approach will be used to ensure that this program does not add additional complexity and time to the permit process. This recommendation will empower staff to make better informed decisions with regards to passive design where discretion is applied in the approvals process.

Staff recognize that some of the recommended design elements, specifically those concerned with glazing, may challenge the current practice recommended by the Vancouver real-estate marketing community. Staff will engage with the marketing, development, and design communities as part of the policy development process to address these issues and others as policy is amended or developed for passive design.

### **STAKEHOLDER CONSULTATION**

The guides were developed by the Sustainability Group in conjunction with a consultant team of local Architects, Green Building Design specialists, and Engineers. The guides were in turn reviewed internally by an interdepartmental team specialising in land-use policy, design, and the development approvals process. It was reviewed externally by the Association of Professional Engineers and Geoscientists of BC (APEG) and the Architectural Institute of BC (AIBC) and the City of Vancouver Urban Design Panel all of whom supported the development and content of the Tool Kits and requested to remain engaged with the continuing evolution of the documents and associated policy.

**FINANCIAL IMPLICATIONS** None. City staff partnered with BC Hydro in the development of both guides in order to reduce costs. Staff will continue to leverage external partner funding to share or offset the costs of the printing and program delivery in order to deliver it to as broad a stakeholder audience as possible.

### **ENVIRONMENTAL IMPLICATIONS**

The Passive Design Tool Kits outline an approach to building design where the reduction of environmental impact is the primary objective. The energy consumption associated with mechanical heating, cooling, ventilation and electrical lighting in buildings is responsible for approximately 54% of all GHG generated in the City. To date, Vancouver's response to dealing with these issues has been to improve the energy utilisation sections of the VBBL. While addressing building envelope issues and mechanical and electrical systems, the VBBL does not address the overall architecture of buildings. This leaves a significant opportunity to reduce energy consumption, and therefore GHG's. If applied aggressively, energy savings through passive design strategies can reduce the GHG emissions associated with new buildings in Vancouver by as much as 80%.

### **COMMUNICATIONS PLAN**

The public consultation process that was implemented in the development of the Tool Kits will be continued once they are made public. There are two objectives of the communications plan:

- (1) to broadly disseminate the recommendations included in the guides through constructive engagement with the development and design industry city-wide as outlined in the body of the report.
- (2) to use the guides to form the basis of a policy development discussion with industry stakeholders by means of consultation with professional committees, associations and other interest groups.

### **CONCLUSION**

Passive Design is a proven concept that has thus far been under-utilized by municipalities as a tool to reduce GHGs. In promoting passive design through education, and policy, the City will not only move closer to achieving its GHG reduction targets but will also will help to make Vancouver the greenest city in the world.

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## Passive Design Tool Kit